

In re Application of:

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PATENT
ATTY. DOCKET NO.: STEM1110-3

AMENDMENT

In the Specification:

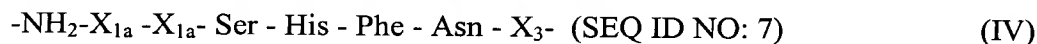
Following the abstract, please insert the enclosed Substitute Sheets as replacement pages 1 through 3 of the Sequence Listing submitted on November 13, 2001.

Please enter the following replacement paragraphs:

[0058] In one embodiment the TGF- α polypeptide, related polypeptide, mimetic or functional fragment is a TGF- α polypeptide as set forth in SEQ ID NO:1, SEQ ID NO:3, or a TGF α mimetic selected from the group consisting of formula I, formula II, formula III, formula IV, or formula V, wherein formula I is:



wherein R_1 is $-NH_2$, or R_1 is R_3-X_3 , wherein R_3 is a polyethylene glycol (PEG) attached to the free NH_2 moiety of X_3 (wherein X_3 is Lys or Asp) and having a molecular weight of PEG of from about 2000 daltons to about 10,000 daltons, or one or more of the following seven amino acids from formula IV, including either L (natural) or D chiral orientations:



wherein X_{1a} is independently Val, Gly or Ala and X_3 is Lys or Asp;

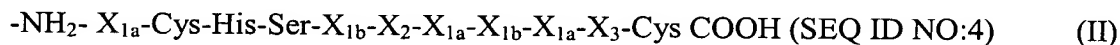
wherein T is the native sequence of human TGF α (SEQ ID NO. 1) from amino acid residue no. 8 (Cys) to amino acid residue no. 43 (Cys) consisting of native L amino acids; and

wherein R_2 is $-COOH$ or one of more of the following seven amino acids, including either L (natural) or D chiral orientations, from formula V:

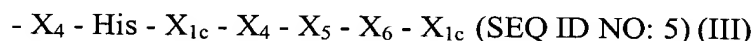


wherein X_4 is Glu or Asp, wherein X_5 is Leu or Ile, wherein X_6 is Asp or Glu, and wherein X_{1c} is independently Val, Gly, or Ala.

[0059] The invention provides a peptide having TGF- α biological activity, comprising at least an 11-membered peptide compound of formula II:



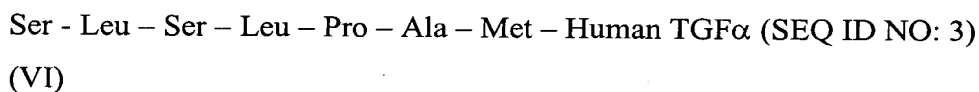
wherein X_{1a} , and X_{1b} are independently Val, Gly, or Ala, wherein X_2 is Tyr or Phe, wherein X_3 is Arg or Lys, and wherein the two Cys moieties form a disulfide bond to create an 11-amino-acid functional peptide having a 10 member loop structure. In addition, at least one or more of the following amino acids of formula III may be added to the C terminus Cys moiety of formula II:



wherein X_4 is Glu or Asp, wherein X_5 is Leu or Ile, wherein X_6 is Asp or Glu and wherein X_{1c} is Val, Gly or Ala. Preferably, X_{1a} is Val, X_{1b} is Gly and X_{1c} is Ala thereby producing an 11, 12, 13, 14, 15, 16, 17 or 18 amino acid peptide. Preferably, X_2 is Tyr, and X_3 is Arg. Accordingly, in one embodiment the functional peptide of the invention has a sequence: $\text{NH}_2\text{-}X_{1a}\text{-Cys-His-Ser-}X_{1b}\text{-}X_2\text{-}X_{1a}\text{-}X_{1b}\text{-}X_{1a}\text{-}X_3\text{-Cys-}X_4\text{-His-}X_{1c}\text{-}X_4\text{-}X_5\text{-}X_6\text{-}X_{1c}\text{-COOH}$ (SEQ ID NO:6)

[0060] SEQ ID NO: 6 forms a 10 member loop structure with a 7 member tail that can be varied in length. In addition, SEQ ID NO: 6 can form dimers comprising, for example, a 34-mer peptide. Accordingly, the functional peptide can be from about 10 to 18 amino acids in length (e.g. 10, 11, 12, 13, 14, 15, 16, 17, or 18 amino acids) wherein X_{1a} is Val, X_{1b} is Gly, X_{1c} is Ala and X_4 is Glu and may also comprise hetero- or homo-dimers of various TGF- α peptides described herein. Such dimers may have greater or reduced activities as compared to monomers.

[0061] The invention further provides an active TGF- $\alpha 57$ polypeptide (SEQ ID NO:3), wherein TGF- $\alpha 57$ is a 57 amino acid polypeptide having the formula VI:



Wherein human TGF α is a 50 amino acid polypeptide having a sequence as set forth in SEQ ID NO:1.

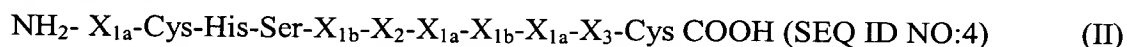
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[0151] The invention further provides a bifunctional compound that acts as a TGF α mimetic, comprising a compound of formula III:

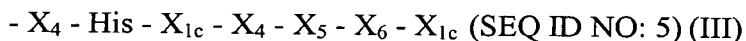
Loop peptide N-terminus-linker-cyclic C₄H₈N₂- linker- Loop peptide N-terminus

(VII)

Wherein the linker moiety is designed to link the N-terminus of the Loop peptide to a nitrogen atom of the ring C₄H₈N₂ and wherein the "loop peptide" comprises at least an 11-membered peptide compound of formula II:



wherein X_{1a}, and X_{1b} are independently Val, Gly, or Ala; X₂ is Tyr or Phe; X₃ is Arg or Lys; and the two Cys moieties are linked via a disulfide bond to form an at least 11-amino acid functional peptide having TGF- α activity. Preferably, at least one or more of the following amino acids are added to the C terminus Cys moiety from formula III, below:



wherein X₄ is Glu or Asp, wherein X₅ is Leu or Ile, wherein X₆ is Asp or Glu and wherein X_{1c} is Val, Gly or Ala. Preferably, X_{1a} is Val, X_{1b} is Gly and X_{1c} is Ala. Preferably the linker group is independently selected from the group consisting of substituted or unsubstituted C₁₋₆ alkoxy, xylene, wherein the substitutions are selected from the group consisting of: oxo, epoxy, hydroxyl, chloryl, bromyl, fluoryl, and amino. Preferably, X₂ is Tyr, and X₃ is Arg. Most preferably, the functional peptide is 18 amino acids in length wherein X_{1a} is Val, X_{1b} is Gly, X_{1c} is Ala and X₄ is Glu.

The invention will now be described in greater detail by reference to the following non-limiting examples.